PFAS Distributions in Surface Waters of the Casco Bay Estuary

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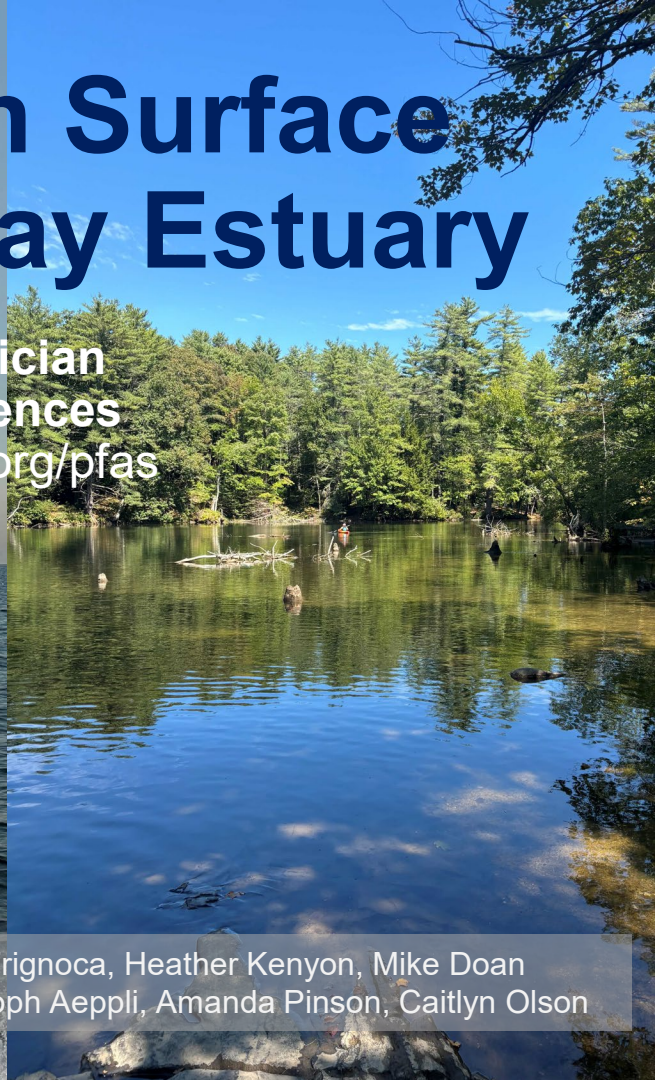
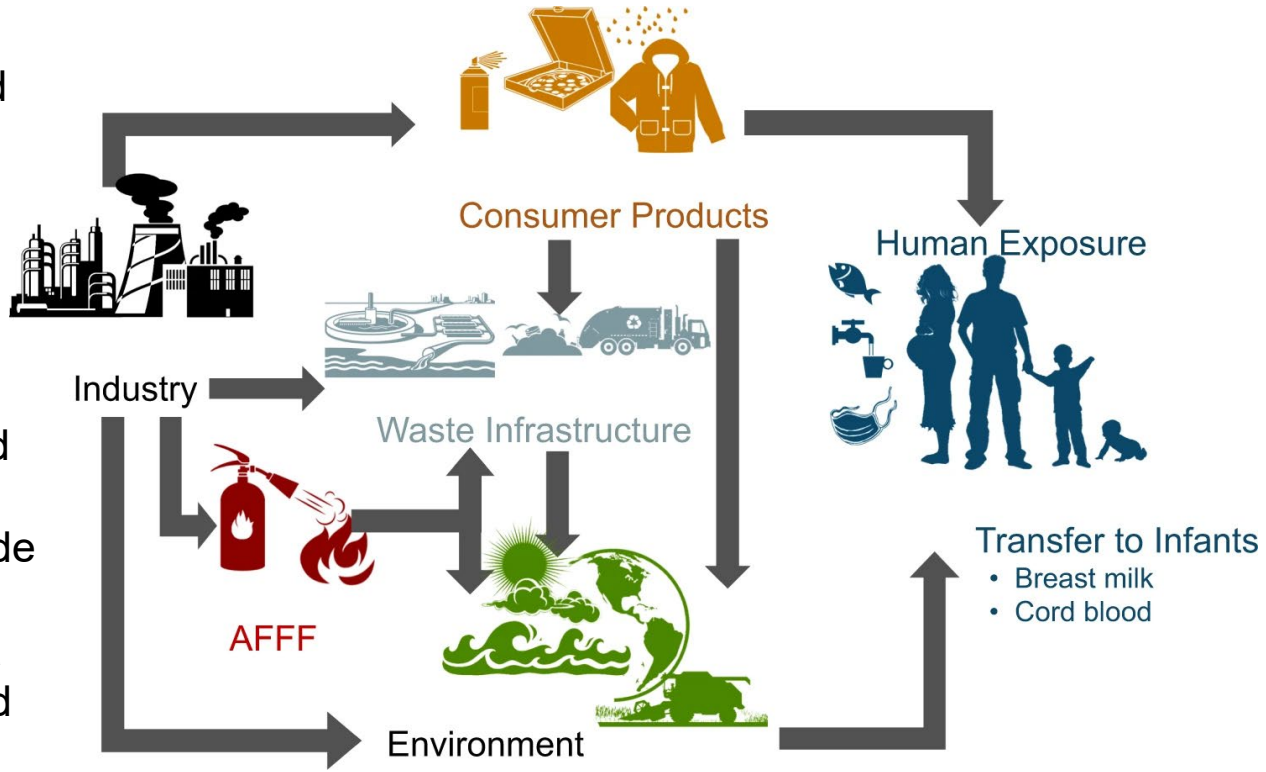


Friends of Casco Bay: Ivy Frignoca, Heather Kenyon, Mike Doan
Bigelow Laboratory: Christoph Aeppli, Amanda Pinson, Caitlyn Olson

Per- and polyfluoroalkyl substances (PFAS)

- Class of over 10,000 compounds characterized by C-F bonds
- In industrial production since 1950, starting with PFOS and PFOA
- Used for non-stick and water resistant properties in consumer products and in fire-fighting foam
- Associated with a multitude of health effects
- Persistent in environment due to water solubility and resistance to microbial degradation

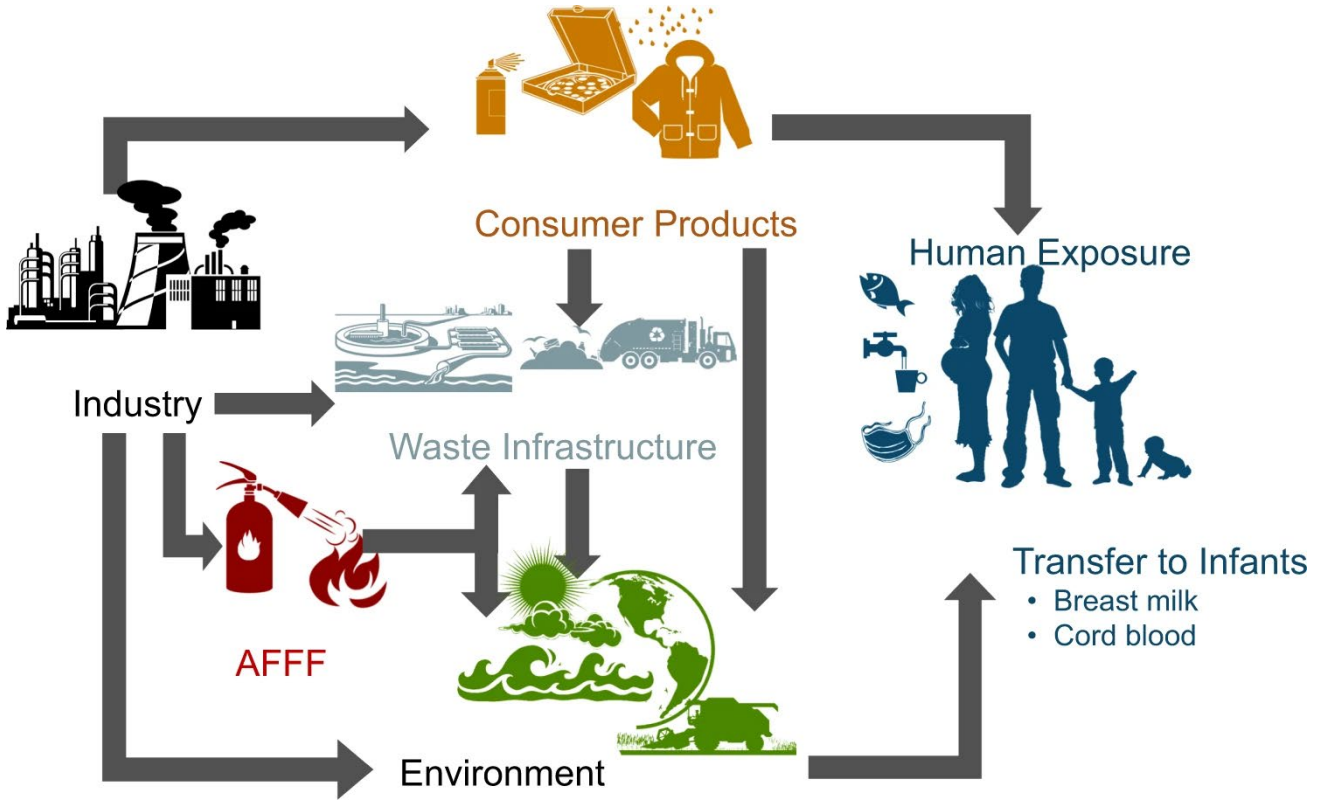


Sunderland et al (2019) J Expo Sci Environ Epidemiol 29:131–147.

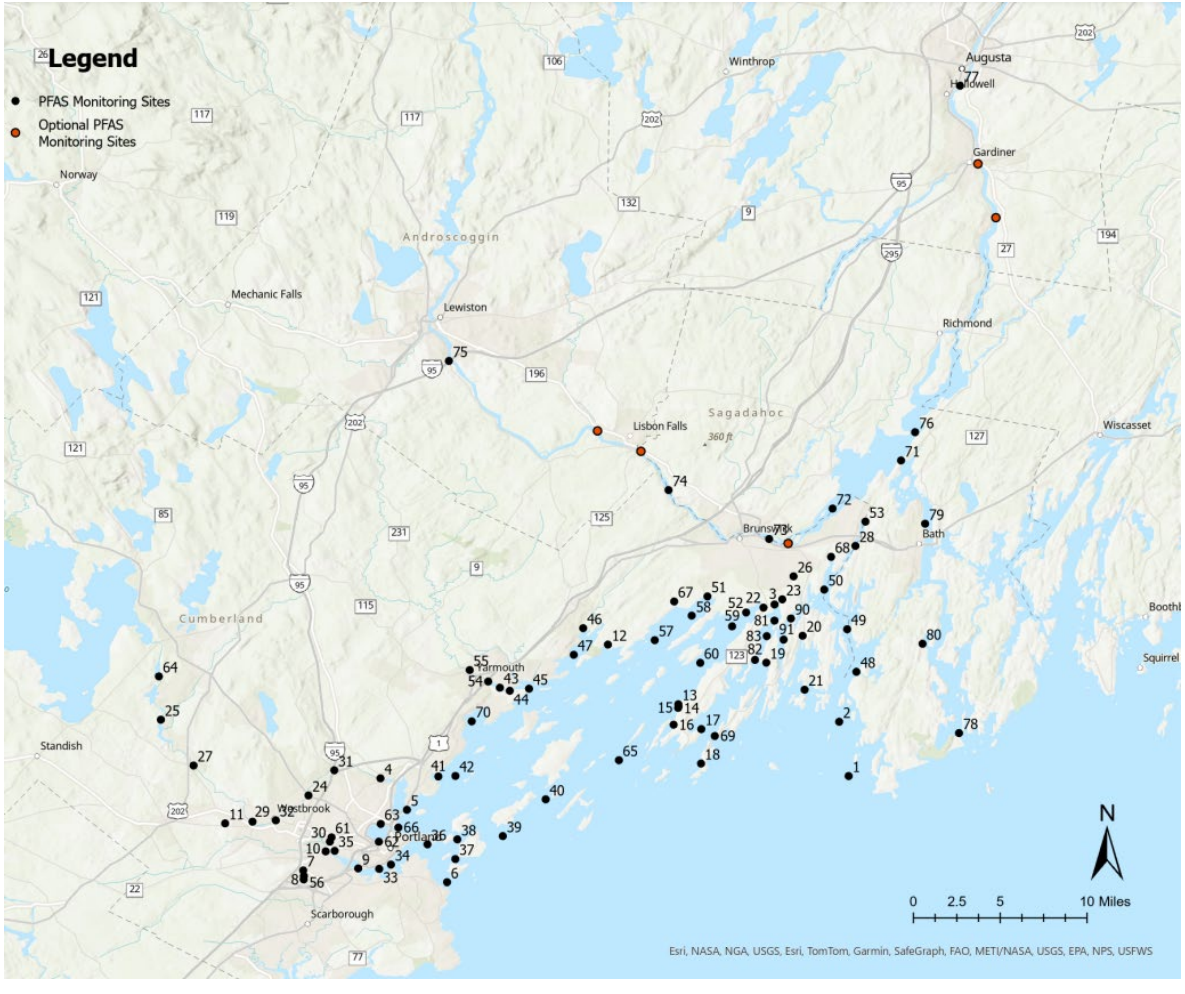
Sources and Fate of PFAS

Sources into coastal ecosystems:

- Firefighting foam (AFFF)
- Industrial effluents
- Wastewater treatment plants (WTTPs)
- Runoff or groundwater from contaminated sites (biosolid-treated fields, landfills, superfund sites)

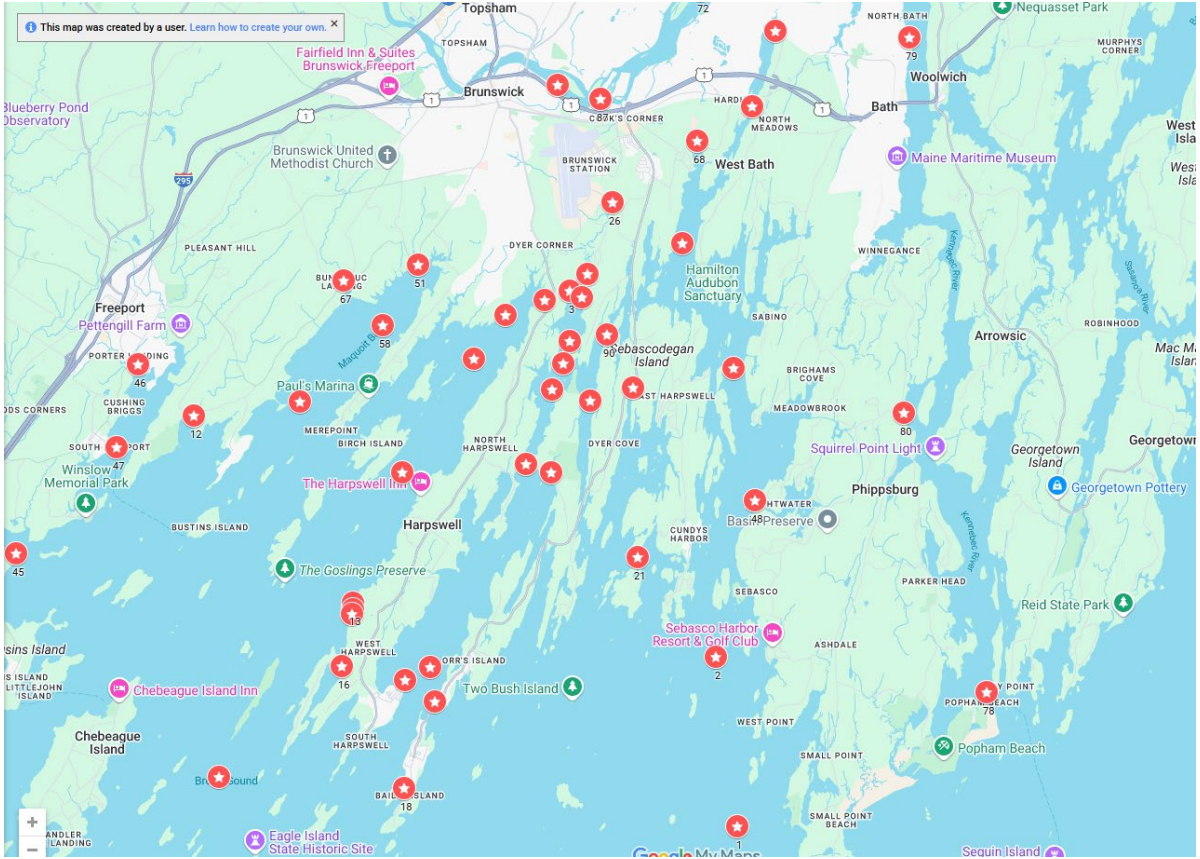


Sunderland et al (2019) J Expo Sci Environ Epidemiol 29:131–147.



PFAS along Maine's coastlines?

Study Area: Casco Bay



PFAS along Maine's coastlines?

Lots of Sites in Harpswell and Brunswick Area

An intense sampling and extraction effort

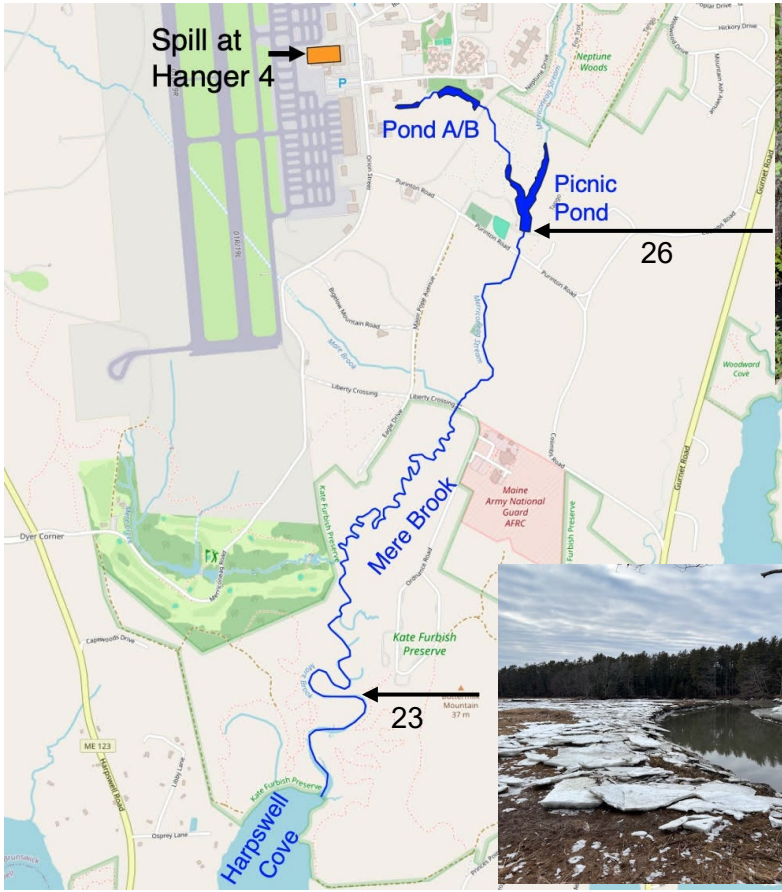
Main sampling campaigns (all sites):
-Sept 9-13, 2024
-October 8-11, 2024
-April-May, 2025

Harpswell Cove extended monthly sampling:
6 consecutive months starting in Sept, to continue throughout this year

90 Stations
Land and boat-based sampling

Method EPA 1633
Isotope dilution
40 PFAS compounds
MRLs of 0.25-0.5 ng/L for most compounds
Using automated Promochrom SPE-03 and Agilent LC/MS
Bigelow PFAS Facility
www.bigelow.org/pfas

August 2024 BNAS PFAS Spill



August 19th, 2024: 1,450 gallons of AFFF was released from Hanger 4 at the Brunswick Naval Air Station

$3.00
Tuesday, August 20, 2024

Portland Press Herald

WEATHER: Partly sunny with showers High 68 Details, D6

pressherald.com

Shawn Patrick Ouellette/Staff Photographer

Firefighting foam blows through the air as workers try to clean up from a massive accidental discharge Monday at Brunswick Executive Airport. The foam filled a hangar big enough for two 747s and spilled out into the parking lot.

Forever chemicals spew from foam spill at Brunswick airport

A malfunctioning fire suppression system discharged 1,600 gallons of firefighting foam at the former Naval Air Station. It was 4 to 5 feet deep in some places, workers said.

By PENELOPE OVERTON
Staff Writer
KRISTIAN MORAVEC
The Times Record

A fire suppression system malfunctioned inside a large airport hangar at the former Brunswick Naval Air Station early Monday morning, resulting in the accidental discharge of 1,600 gallons of firefighting foam concentrate that contains dangerous "forever chemicals."

The spill has alarmed neighbors and Brunswick residents who serve on the advisory board that oversees the environmental cleanup at the former military base, which closed and is being redeveloped as a result of a federal base realignment action in 2005.

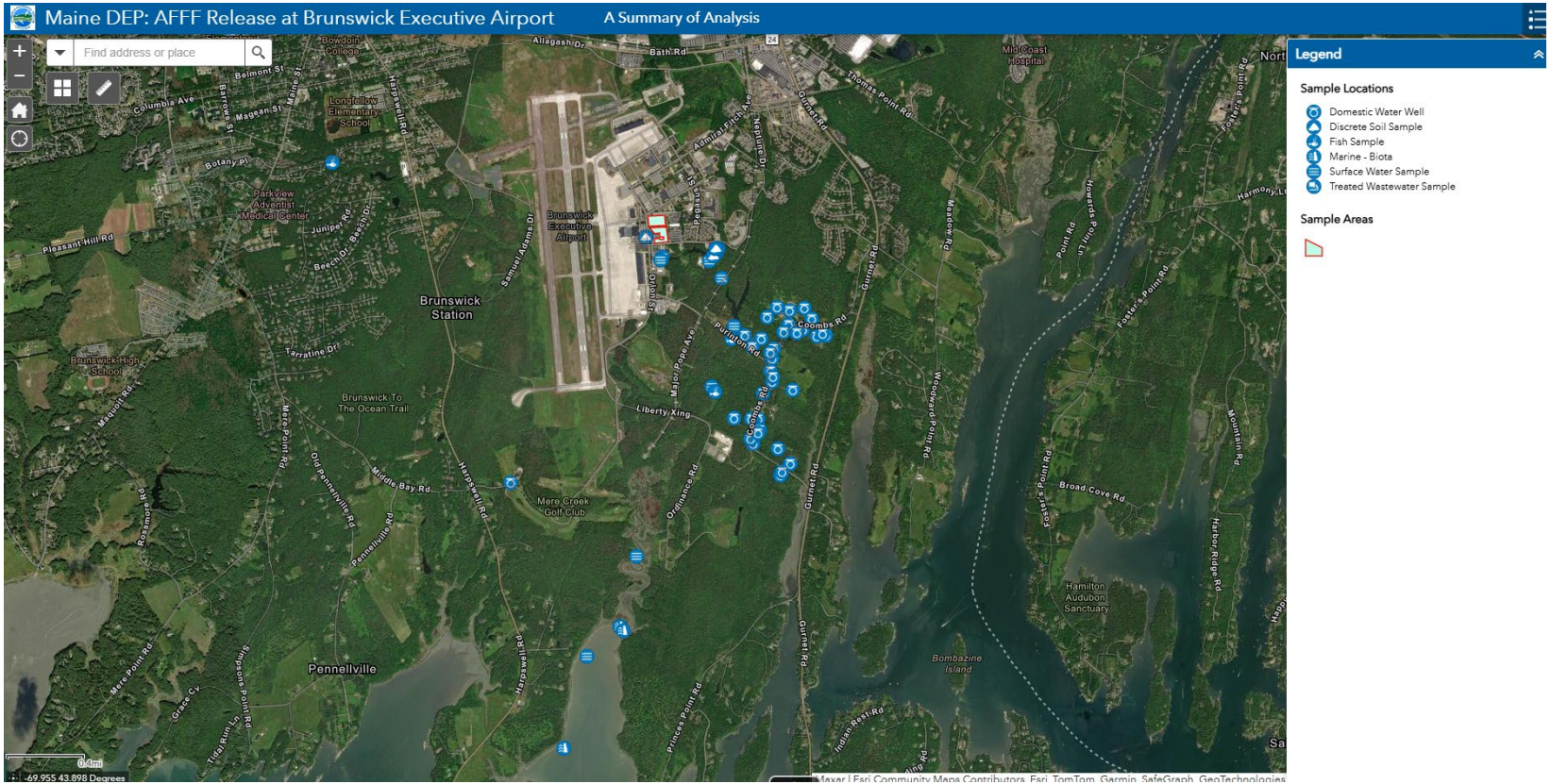
"The worst fears that we have had have happened," said Suzanne Johnson, a Brunswick attorney who is co-chair of the Restoration Advisory Board. "We were worried about a teacup full of (forever chemicals) being released and instead we have 1,800 gallons."

Johnson said the amount of forever chemicals that has

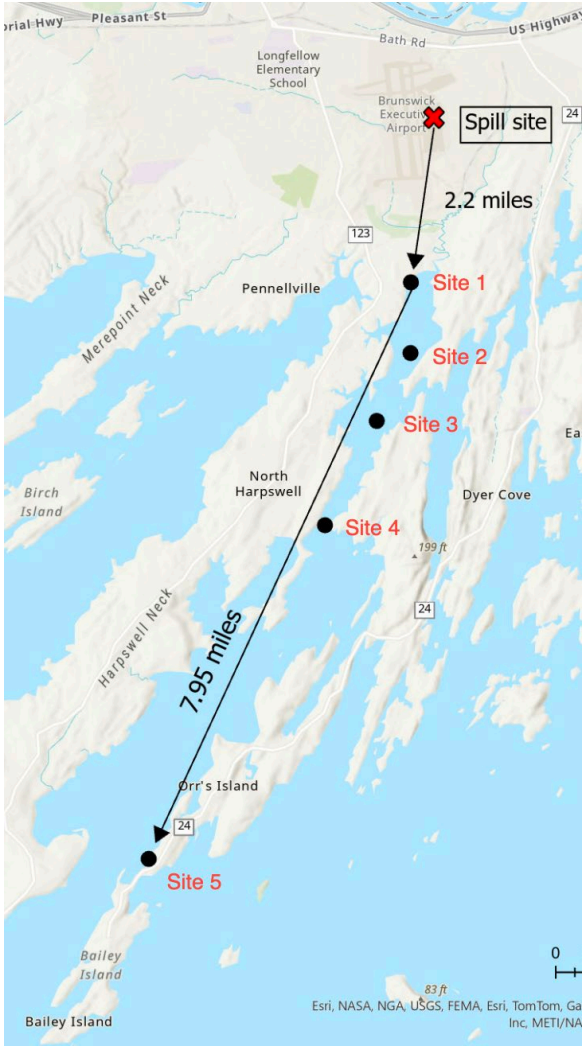
Please see SPILL, Page A5

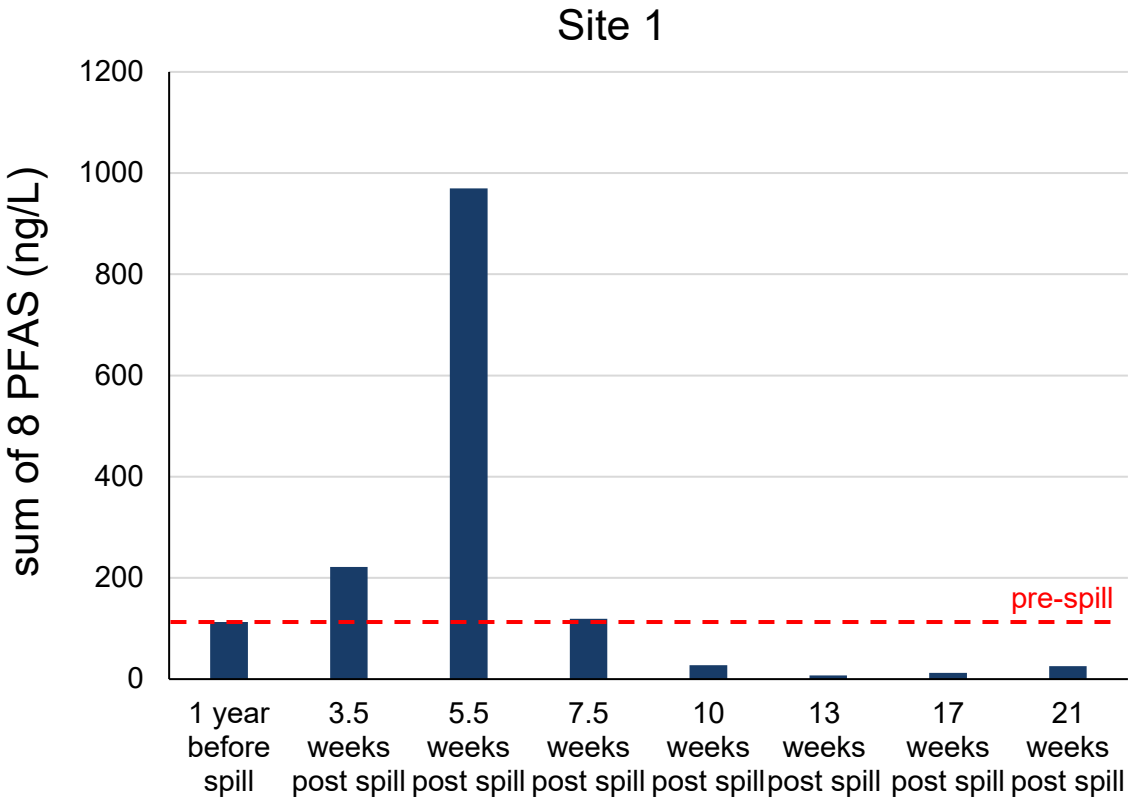
STAFF GRAPHIC | JAKE LAWS

DEP Sampling

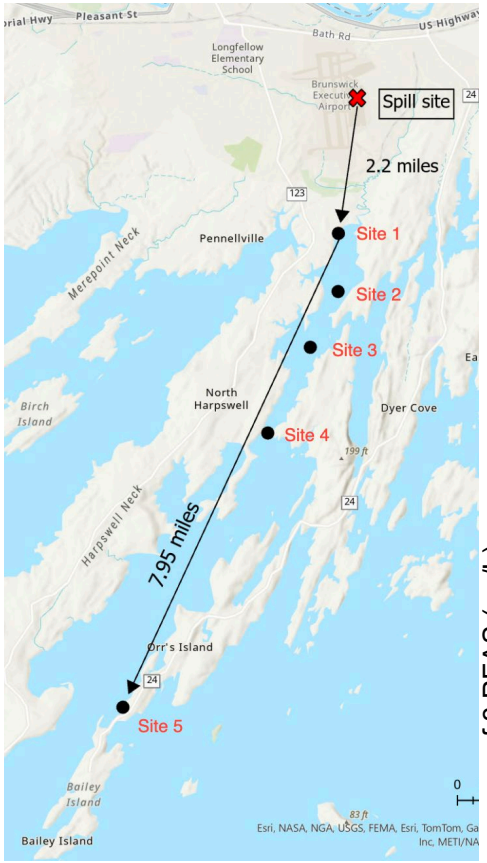


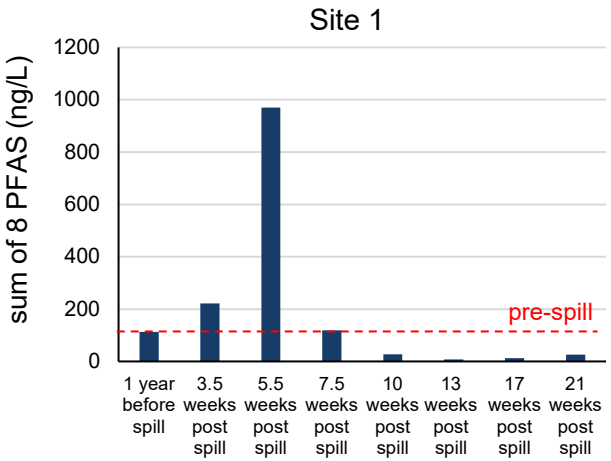
LINK: https://www.maine.gov/dep/projects/bnas/index.html or Google “DEP BNAS PFAS Spill”

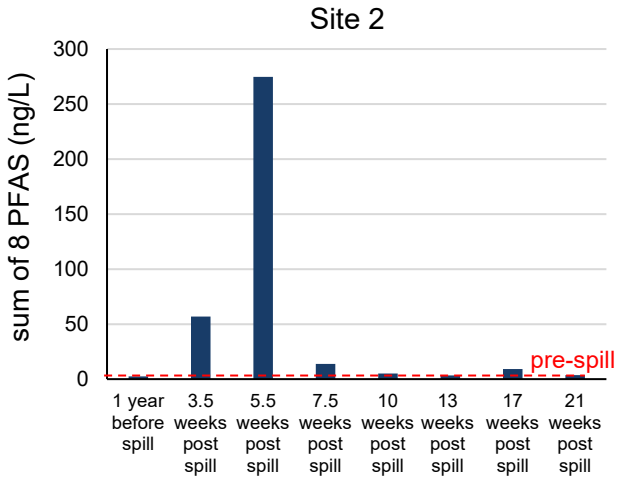


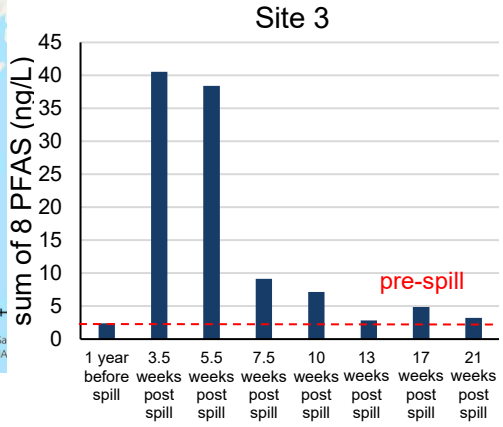


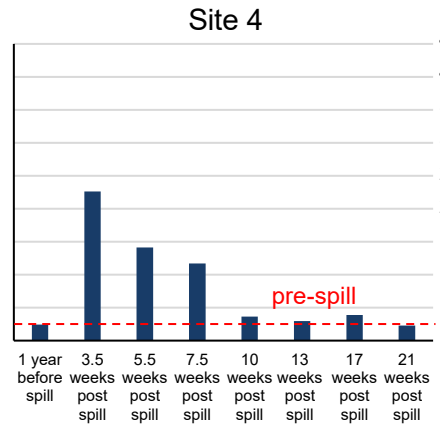
Sum of 8 PFAS: PFOS, PFOA, PFHxS, PFHxA, PFOSA, PFNA, 6:2 FTS, PFHpA

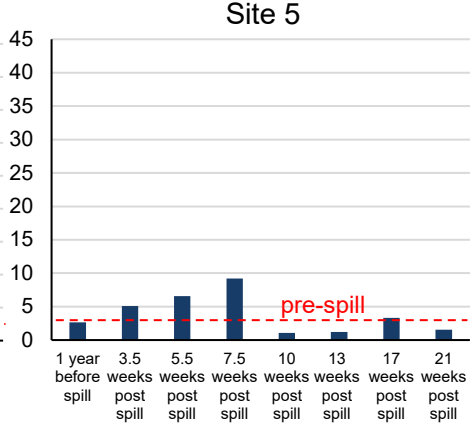

Spill site
2.2 miles
Site 1
Site 2
Site 3
Site 4
7.95 miles
Site 5
Pennellville
North Harpswell
Dyer Cove
Orr's Island
Bailey Island
Longfellow Elementary School
Brunswick Executive Airport
Merepoint Neck
Birch Island
Harpswell Neck
Esri, NASA, NGA, USGS, FEMA, Esri, TomTom, Ga Inc, METI/NA

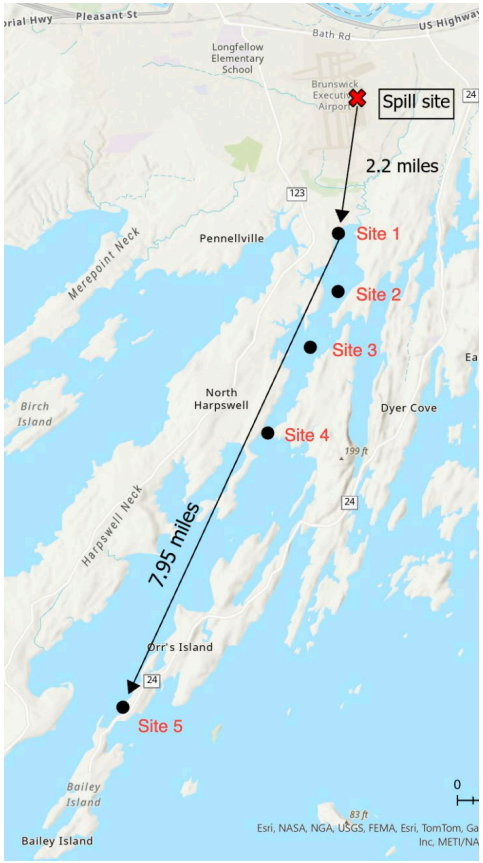

Site 1
sum of 8 PFAS (ng/L)
0
200
400
600
800
1000
1200
pre-spill
1 year before spill
3.5 weeks post spill
5.5 weeks post spill
7.5 weeks post spill
10 weeks post spill
13 weeks post spill
17 weeks post spill
21 weeks post spill

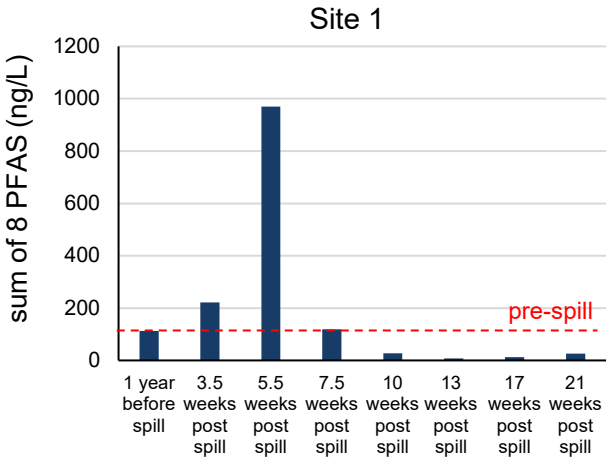

Site 2
sum of 8 PFAS (ng/L)
0
50
100
150
200
250
300
pre-spill
1 year before spill
3.5 weeks post spill
5.5 weeks post spill
7.5 weeks post spill
10 weeks post spill
13 weeks post spill
17 weeks post spill
21 weeks post spill

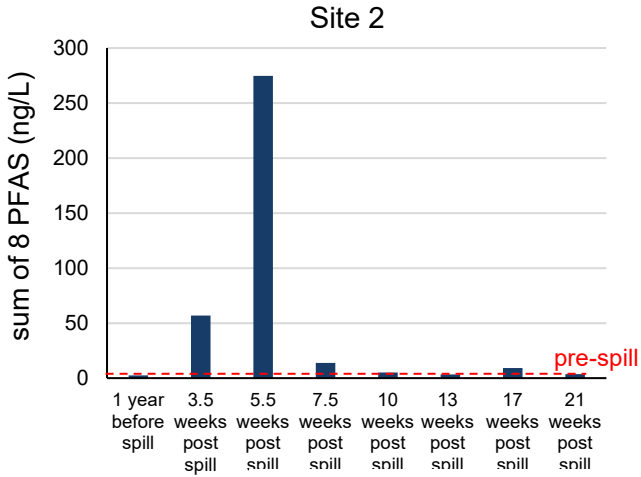

Site 3
sum of 8 PFAS (ng/L)
0
5
10
15
20
25
30
35
40
45
pre-spill
1 year before spill
3.5 weeks post spill
5.5 weeks post spill
7.5 weeks post spill
10 weeks post spill
13 weeks post spill
17 weeks post spill
21 weeks post spill

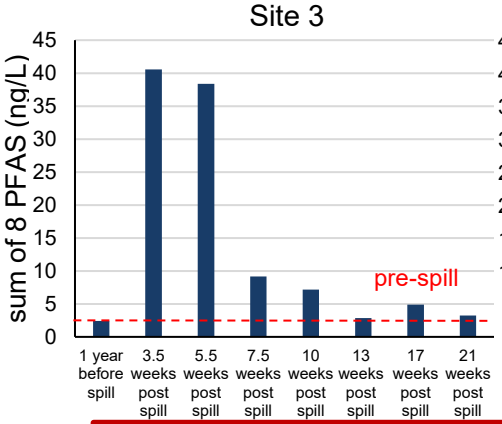

Site 4
0
5
10
15
20
25
30
35
40
45
pre-spill
1 year before spill
3.5 weeks post spill
5.5 weeks post spill
7.5 weeks post spill
10 weeks post spill
13 weeks post spill
17 weeks post spill
21 weeks post spill

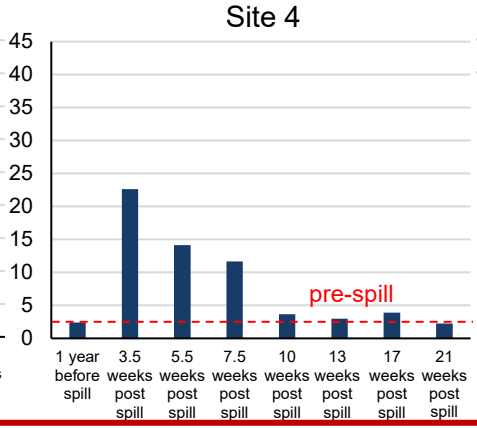

Site 5
0
5
10
15
20
25
30
35
40
45
pre-spill
1 year before spill
3.5 weeks post spill
5.5 weeks post spill
7.5 weeks post spill
10 weeks post spill
13 weeks post spill
17 weeks post spill
21 weeks post spill

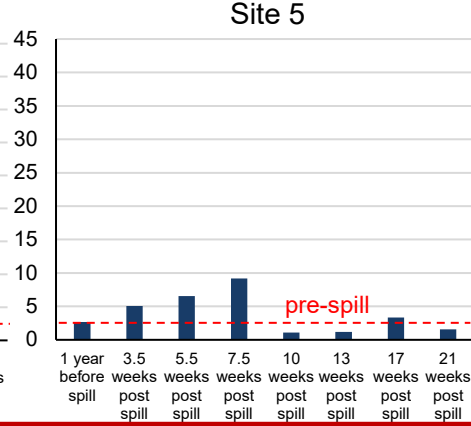








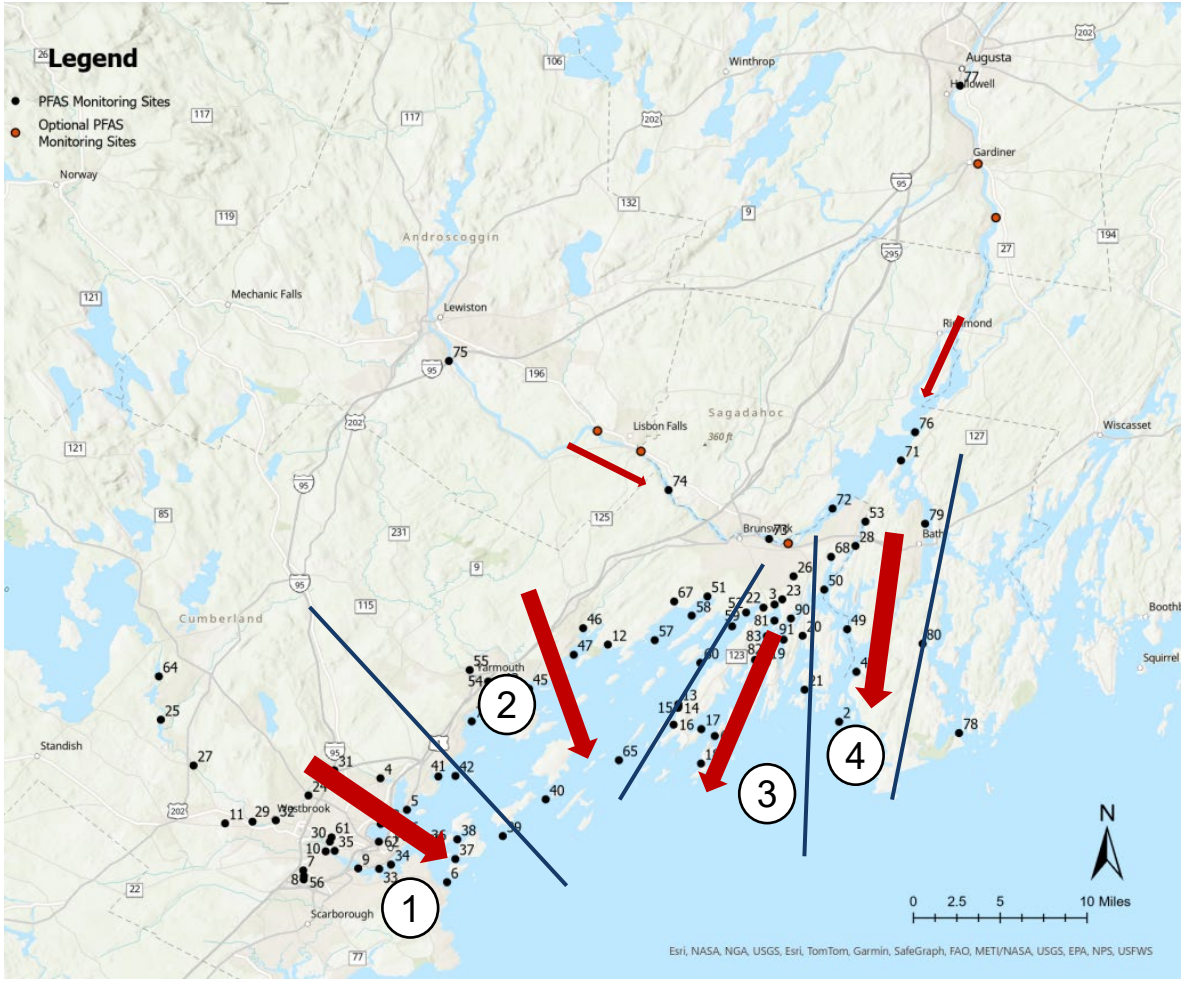




Concentrations reached approximate "pre-spill" levels around 3.25 months after the spill (November), with continued water and sediment testing of these sites to come

Acknowledgements and Contacts

- Senior Research Scientist Christoph Aeppli: caeppli@bigelow.org
- Research Technician Hannah Sterling: hsterling@bigelow.org
- Ivy Frignoca, Friends of Casco Bay: ifrignoca@cascobay.org
- Heather Kenyon, Friends of Casco Bay: hkenyon@cascobay.org
- Mike Doan, Friends of Casco Bay



PFAS along Maine's coastlines?

Study Area: Casco Bay

Potential PFAS Sources

1) Stormwater & Industrial effluent
2) Agricultural runoff from sludge spreading sites
3) BNAS superfund site
4) Kennebec & Androscoggin River (runoff, WWTP)